

REMARKS

The Final Office Action indicated a new rejection that relies upon a reference cited only in name (Downey, et al) without citing any specific prior art document, such as a patent number or other relevant information. Applicant is thus unable to address the nature of the rejection and the cited reference, and therefore submits that the Final Office Action is improper. Applicant further submits that, while the Final Office Action indicates that “Applicant’s arguments with respect to the above rejection are addressed in the statement of rejection above,” the Office Action ignored the majority of Applicant’s traversals as presented in the previous Office Action Response of record, which is contrary to M.P.E.P. 707.07(f) and relevant law. Generally, the Office Action continues to rely upon a sole reference in rejecting claims 1-9 under Section 103 (requiring a combination of references), without citing any supporting reference as teaching or suggesting claim limitations that are not disclosed in the ‘280 reference, and without citing or asserting any motivation for modifying the ‘280 reference. Moreover, the Final Office Action has not directly addressed limitations in new independent claim 12, or claims 13-20 that depend therefrom. Applicant therefore submits that the rejections are improper, and further that the finality of the Office Action is improper. The following addresses the rejections as previously traversed, as well as the new rejections (to the extent Applicant can understand the nature of the new rejections).

The Final Office Action dated July 8, 2008 indicates that claim 6 stands objected to; claims 1-9 stand rejected under 35 U.S.C. § 103(a) over Keys *et al.* (U.S. Patent Pub. 2004/0235280, hereinafter “the ‘280 reference”); claims 3 and 10-20 stand rejected under 35 U.S.C. § 103(a) over the ‘280 reference and further in view of Wu *et al.* (U.S. Patent No. 4,584,026); claims 3, 10, 12, 13 and 15-20 stand rejected under 35 U.S.C. § 103(a) over the ‘280 reference and further in view of Downey *et al.* (no citation provided). Applicant traverses all of the objections and rejections. In addition, unless Applicant expressly indicates otherwise, Applicant does not acquiesce to any objections, rejections or averments made in the Office Actions of record.

Applicant respectfully maintains the traversal of the Section 103 rejection of claims 1-9 over the sole ‘280 reference. Neither the Final Office Action nor the previous Office Action of record has cited any reference for combining with the ‘280 reference (under

Section 103), has provided any motivation for modifying the '280 reference, or has cited teaching or suggestion of all of the limitations in each of claims 1-9. Generally, the rejection is confusing and unclear as to how teaching or suggestion of all of the claim limitations is being asserted, fails to indicate which claim limitations are not taught in the '280 reference (as required by the M.P.E.P.), and fails to indicate how any limitations are being combined with the '280 reference. As no secondary reference has been cited, it is unclear as to whether the Office Action is alleging that certain limitations are inherent or otherwise obvious, or that other references teach or suggest the claim limitations. In any event, the Office Action has clearly failed to establish a *prima facie* Section 103 rejection, and has correspondingly failed to present the Applicant with a rejection that is clear and understandable. Applicant is therefore unable to adequately address the merits of the rejection and formulate a response thereto.

To the extent Applicant can understand the rejections, Applicant submits that the sole '280 reference does not teach or suggest, nor has the Office Action asserted, the claimed low-temperature anneal carried out after an ion implant of dopant atoms of a second conductivity type. The Final Office Action appears to attempt to address limitations directed to a low temperature anneal carried out after the introduction of dopant atoms. However, this attempt appears misplaced as the Office Action's assertion that the "claims do not require the heat treatment in the range of 500°C - 800°C to be performed after the introduction of the dopant atoms" appears to ignore line 15 of claim 1, which characterizes an anneal carried out after the introduction of dopant atoms described at lines 10-12.

Applicant believes that the Examiner's misunderstanding of the limitations directed to an anneal in the range of about 500 to 800 degrees Celsius (in claim 1) may be related to the use of the term "characterized in that" to characterize the annealing discussion made earlier in the claim. In this context, Applicant has amended claim 1 in an attempt to assist the Examiner in this understanding and facilitate prosecution. Applicant believes that limitations in amended claim 1 directed to annealing have not been narrowed in scope and are consistent with the claim, prior to amendment, and further believes that such amendments are appropriate after final (e.g., to place the claims in condition for appeal).

In view of the above and as consistent with the previous response of record, the Office Action appears to have mistakenly cited an anneal process that is carried out at an

intermediate stage of manufacture, prior to any implant of dopants that are used (*e.g.*, as carried out to form source or drain extension regions). Specifically, the anneal process cited at paragraph 0028 in the ‘208 reference is carried out before implanting Boron (cited as teaching “dopant atoms of the second conductivity type”). In this regard, neither the Office Action nor the cited portions of the ‘280 reference discuss claim limitations directed to “after introduction of the dopant atoms of the second conductivity type, the semiconductor body is annealed by subjecting it to a heat treatment” (at a temperature range of 500-800°C) as in claim 1.

In addition to the above and as previously discussed, the ‘280 reference uses a much higher temperature anneal after implant of its Boron atoms to address defect issues and to drive the Boron atoms into the substrate to distribute them into the amorphous region. For instance, paragraphs 0032 and 0033 discuss this subsequent annealing process as a laser anneal that is carried out at a temperature of between about 1200-1400°C to ensure that the second annealing melts the amorphous region and allows the dopants (*e.g.*, Boron) to evenly distribute. As discussed at paragraph 0032, this approach is to form an abrupt junction that is “substantially defect-free.” This annealing approach does not teach or suggest the claimed approach, directed to a low-temperature anneal. As discussed at paragraph 0006 of the instant application, this low-temperature anneal is consistent with “the surprising recognition that annealing at intermediate temperatures, *e.g.* in the range of 800 to 950 degrees Celsius, is not suitable because at these temperature[s] a deactivation occurs of the Boron atoms....”

In view of the above, the Section 103 rejection of claim 1 is improper and should be removed. Accordingly, the Section 103 rejection of claims 2-9 (as well as claims 10-11), which depend from claim 1, should also be removed because the rejections rely upon the same, improper basis.

Applicant further traverses the Section 103 rejections over the sole ‘280 reference in that all of the limitations in the dependent claims 2-9 have not been addressed. No reference has been cited as providing any teaching or suggestion of these limitations, and no indication as to where the limitations are taught or suggested in any prior art. The ‘280 reference fails to recognize the mitigation of deactivation of Boron (or other dopant) in carrying out an annealing process that is limited to a temperature range of between about

550 and 750 degrees Celsius so that “the deactivation of dopant atoms is nearly completely avoided.” As is consistent with relevant case law and the M.P.E.P., the larger range of 400-800°C disclosed in the ‘280 reference is not recited with sufficient specificity (and with no supporting recognition of any deactivation problem) to anticipate the claimed range. Specifically regarding claim 7, the Office Action’s suggestion that mere overlap of temperature ranges is sufficient to establish and maintain a *prima facie* Section 103 rejection is improper. As discussed above, relevant law indicates that an overlap in range is insufficient to support teaching or suggestion of a specific range as claimed (e.g., where that range is used to achieve characteristics as in the instant claimed invention). Applicant therefore requests that the rejections of dependent claims 2-9 also be removed for these reasons.

Applicant submits that the Section 103 rejection of claims 3 and 10-20 over the ‘280 reference in view of the ‘026 reference is also improper for reasons stated above, because the ‘280 reference does not teach or suggest limitations directed to the claimed dopant and anneal approaches. Specifically regarding the rejection of independent claim 12, which was added by amendment in the previous Office Action Response, the Office Action has not addressed the claim limitations in lieu of referring to earlier discussion of limitations in claim 1, yet claim 12 is different than claim 1. Applicant submits that the Office Action has thus not established (or even asserted) teaching or suggestion of various limitations in claim 12, such as those directed to implanting inert atoms to form an amorphous region, and then implanting temporary dopant atoms at the amorphous region and ion-implanting dopant atoms of a second conductivity type at the amorphous region. The rejection has also failed to allege any teaching or suggestion of claim limitations directed to an anneal, after ion-implanting dopant atoms of the second conductivity type, via heat treatment in a range of between about 550 and 750 degrees Celsius to recover the amorphous region and form a second semiconductor region. The Office Action has also failed to address various dependent claim limitations, including those in claims 10 and 11 (which depend from claim 1), respectively directed to mitigating the deactivation of dopant atoms and to further low-temperature processing steps.

In addition, the cited portions of the secondary ‘026 reference (column 3:14-17 and 47-62) do not teach or suggest the claim limitations as suggested. These cited portions

appear to discuss dopant activation via temperatures below 800°C but do not teach or suggest the claim range of 500°C to 800°C.

Furthermore, neither the '280 reference nor the secondary '026 reference discloses a low-temperature anneal as claimed, carried out after the introduction of dopant atoms of a second conductivity type, relative to the claimed amorphous region, temporary dopant implant, and anneal. For example, page 2 of the Office Action suggests that the '280 reference discloses implanting temporary ions, annealing, and then implanting Boron. Page 3 of the Office Action then discusses an anneal in the secondary '026 reference, but the cited anneal is of Boron atoms that are implanted after an amorphizing implant of Fluorine (see, e.g., column 3:48-55). In this regard, the cited combination of references not only fails to provide correspondence to the claim limitations, the cited portions of the '026 reference fail to correspond to the process cited in the primary '280 reference. In short, the Office Action's attempt to simply cite to a low-temperature anneal in the '026 reference fails to show teaching or suggestion of the claimed anneal, carried out on dopant atoms of a second conductivity type.

Also regarding the Section 103 rejection over the combination of the '280 and '026 references, the Office Action's assertion that modifying the '280 reference "would have been obvious" because the secondary '026 reference "would be used for it's disclosed purpose" is inconsistent with the discussion in the '026 reference. That is, the purpose of the '026 reference is for "Pre-amorphizing with Fluorine Ions" as stated in its title. This pre-amorphizing is carried out for a first amorphizing implant, prior to implanting dopant atoms, such that the anneal is carried out *prior* to implanting a second set of dopant atoms (see, e.g., the Title, Abstract and column). However, as stated at page 2 in the Office Action, the '280 reference is asserted as teaching annealing and "then implanting boron ions." In this regard, there is no motivation to modify the primary '280 reference with a post-Boron implant anneal, as the proposed combination would change its asserted operation and purpose.

In view of the above, the Section 103 rejection over the combination of the '028 and '026 references is improper because the cited references fail to teach or suggest all of the claim limitations, and because there is no motivation to combine the references as asserted.

Applicant also traverses the Section 103 rejection of claims 3 and 10-20 over the '280 reference in view of the Downey (no citation) reference. These rejections are improper

because the Office Action has not properly identified the Downey reference. As discussed above, the Office Action has not cited enough information by which the Applicant can identify the asserted Downey reference in order to assess the merits of the rejection and appropriately respond thereto. There is no citation to any patent document, or other document, upon which the rejection is relying.

The Section 103 rejections of claims 3 and 10-20 are also improper for reasons stated above in that the '280 reference does not teach or suggest limitations directed to the claimed dopant and anneal approaches, because the Office Action has failed to assert correspondence to various claim limitations, and because there is no motivation to combine the references as asserted. For example, as discussed above in connection with the Section 103 rejection over the combination of the '280 and '026 references, the Office Action has not asserted correspondence to limitations of independent claim 12 (or, correspondingly, to claims 13-20 that depend therefrom). Regarding the combination of the Downey and '280 references, and the proposed combination of the '026 reference with the '280 reference as discussed above, the Office Action appears to be relying upon combining a post-boron implant anneal with an asserted pre-boron implant anneal (see pages 2 and 4 of the Office Action). As discussed above, this (confusing) proposed combination fails to teach or suggest all of the claim limitations, and further lacks motivation as it would apparently remove the asserted purpose of the '280 reference. In this regard, the Section 103 rejection over the combination of the '280 and Downey references is also improper and should be removed.

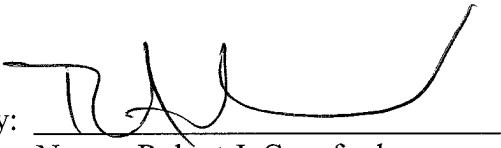
Claim 1 has also been amended to remove a reference number provided by way of example in related foreign prosecution-type claims. Applicant has also amended claim 6 to change the term "comprising" to "consisting of" as suggested by the Examiner.

In view of the remarks above, Applicant believes that each of the rejections/objections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Peter Zawilski, of NXP Corporation at (408) 474-9063.

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